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Editorial

It will be apparent to readers of the *Journal* that the studies reported herein have been of diverse initiation and sponsorship. There have been rewrites of significant masters' theses completed during the last few years. There have been reports on investigations carried out as masters' theses with the support of the research organization. There have been research studies as such by staff members and students in the Faculty of Education. There have been reports on research done outside the faculty in which staff members have participated with the approval of the Advisory Committee.

In the present issue Michael Skuba's analysis of English errors and difficulties is an example of a master's study as such. Climenhaga's study was completed in partial fulfilment of requirements for the master's degree, but it could not have been successfully completed without the various kinds of assistance afforded by the research organization. The Dunlop-Hunka-Zingle study is evidence of the value of cooperative endeavours on the part of staff and students, while Dorothy Lampard's investigation of spelling is an example of research by an individual staff member. Dr. Clarke's article on promotion policies shows the participation of a staff member in research initiated by the Department of Education.

It is to be expected that as time goes on the research studies in this Journal will be related less and less to masters' theses and more and more to projects initiated by the research committee. This is by no means to suggest that outstanding masters' theses will not be reported here. But it is to be expected that significant work at the master's level will have specific and increasing support from the research committee. Furthermore, with the development of lines of communication between the Faculty and various teacher, administrative, and other groups throughout the province, the committee is counting upon the development of field teams and organizations for research purposes. One good illustration of this sort of thing is a study of busing now being undertaken on a divisional basis. Another is a study of giftedness instigated by the School Trustees' Association. Some field studies will presumably be of the kind known as action research, but there is ultimately no reason why pure research should not develop as well.

It will be the policy of the Research Committee to indicate in future issues the nature of the research sponsorship—especially those projects undertaken specifically at instigation of and with the continuing supervision of the Research Committee.

INDIVIDUAL DIFFERENCES IN ALBERTA SCHOOLS

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Introduction

Educational research permits us to make periodic examinations of the educational 'facts of life.' This may prove a disturbing experience. However, facts are facts and must be faced. If we are doing everything we can to meet the situation the process need not be too painful. One of these educational facts is the matter of individual differences in our classrooms.

The existence of individual differences in ability and achievement has never been questioned. In any grade we know that Johnnie may be a very good reader and that May reads haltingly, with much lip movement, analysis and trial and error. Olive may be gifted in arithmetic, but Henry just does not seem to be making much progress. What parents and even teachers and principals find hard to accept is the extent of the differences in intelligence and achievement which exist within the walls of the ordinary classroom. With the development of standardized tests of achievement which express attainment as grade score, and first rate instruments for the measurement of intelligence, it is now possible to examine objectively the nature and extent of individual differences in our classrooms.

This report is written for all who are interested in Alberta education. It is for parents, for school trustees and members of home and school associations, as well as for teachers who already are familar with the facts reported. However, even teachers, principals and superintendents will read with interest the facts concerning Alberta children, if only for the reason that objective reporting and publication of facts concerning Alberta schools has not always been possible.

Let us begin by reporting the facts discovered in a survey of achievement in New York City. J. Wayne Wrightstone[1] made an analysis of reading achievement of 6,581 third-grade pupils in New

[1] J. Wayne Wrightstone, **Analysis of Intelligence and General Achievement in Third Grade Classes.**

York City. Twelve per cent did as well as or better than fifth grade pupils, while twelve per cent did worse than children at the grade II level. This represents a spread of at least five grades in reading achievement. 6,481 third grade pupils wrote the Stanford Achievement Spelling Test. Seven per cent did as well as or better than fifth grade pupils, while twelve per cent were below the grade II level—another spread of at least five grades.

In the same city Wrightstone[2] administered the Stanford Achievement Reading Test to 11,178 pupils in grade VII. In Paragraph Meaning the scores of 304 pupils reached or exceeded the grade XII level while 1,328 had scores at or below the level of grade V. This is a spread of at least eight grades. Wrightstone also found that, in 25,638 pupils tested in grade VIII reading, 577 pupils were at or below the grade IV standard while 420 were above grade XII or at college level, a spread of at least nine grades.

At this stage you may be saying: "But this is academic insanity! Have they no standards? The very idea of a spread of achievement of five grades in grade III or nine grades in grade VIII! That kind of thing might happen in New York or Oklahoma or Timbuctoo. It couldn't happen here!"

The excellent studies of intelligence and achievement in Alberta schools which already have appeared or will appear in this journal, and which were conducted under the direction of the Alberta Committee on Educational Research, furnish us with the data on individual differences which are required for a report parallel to that prepared by Wrightstone for New York City. We are indebted to Carmichael[3], to Reid and Conquest[4], and to Climenhaga[5] for the facts which follow.

Distribution of Intelligence in Alberta Schools

In planning the Reading-Language study, the committee in charge decided to use the California Short Form Test of Mental Maturity. In the companion study of arithmetic achievement, the Otis Quick Scoring Test of Intelligence was utilized. As a result we have two studies of the distribution of intelligence in Alberta children, one for grade VII, the other for grade VIII.

Table I analyzes the distribution of intelligence for Urban, Town, Graded Rural and Ungraded Rural samples. It also provides a

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[2]J. Wayne Wrightstone, **Analysis of Results: Survey of Intelligence and Reading Ability in 7A Classes, Junior High Schools.**

[3]Anne Carmichael, "A Survey of Reading Achievement in Alberta Schools", **The Alberta Journal of Educational Research** (March, 1955), pp. 18-33.

[4]T. James Reid and George R. Conquest, "A Survey of the Language Achievement of Alberta School Children", **The Alberta Journal of Educational Research** (June, 1955), pp. 39-52.

[5]Clarence E. Climenhaga, **A Survey of Arithmetical Achievement of Grade VIII Pupils in Alberta Schools.**

combined distribution of 1,044 pupils. It is accepted that children of intelligence falling below 80 I.Q. are of necessity slow learners, and unlikely to make normal progress through our schools. In this study 3.92% or 41 children of the total sample are in this category. On the other hand 65 children or 6.21% have an I.Q. of 120 or above, a level of intelligence suited to training for the learned professions. These figures make evident how varied the population of our grade VIII classrooms must be. Actually the spread of intelligence in the Alberta grade VIII sample was I.Q. 61 to I.Q. 141, a range of 80 I.Q. points.

Table II was prepared from the data secured in the survey of achievement in reading and language in grade VII and is based on the California Short Form Test of Mental Maturity. The distribution resembles that in Table I. In this study 12.38% or 97 pupils are of I.Q. 120 or above, and 40 pupils or 51.1% are below I.Q. 80. The actual range of intelligence in the sample was from I.Q. 54 to I.Q. 137, a spread of 83 I.Q. points. Both studies reveal the tremendous differences in intelligence of children in both grade VII and grade VIII in Alberta Schools.

TABLE I

DISTRIBUTION OF I.Q. SCORES (OTIS) OF GRADE VIII PUPILS IN ALL TYPES OF ALBERTA SCHOOLS*

Grade Scores	Urban		Town		Graded Rural		Ungraded Rural		Total	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
140-149	2	.5	0	0	0	0	0	0	2	.19
130-139	3	.8	2	.9	0	0	1	.5	6	.57
120-129	29	7.5	13	5.5	9	4.1	6	3.0	57	5.45
110-119	109	28.4	46	19.6	58	26.1	27	13.4	240	23.00
100-109	116	30.3	73	31.1	62	27.9	58	28.7	309	29.60
90- 99	87	22.6	63	26.8	62	27.9	56	27.7	268	25.68
80- 89	29	7.5	26	11.1	24	10.8	42	20.8	121	11.60
70- 79	9	2.3	11	4.7	6	2.7	11	5.4	37	3.54
60- 69	1	.3	1	.4	1	.5	1	.5	4	.38
TOTALS	385	100.2	235	100.1	222	100.0	202	100.0	1044	100.01

*After Climenhaga and Pritchard.

TABLE II

DISTRIBUTION OF I.Q. SCORES OF GRADE VII PUPILS IN ALL TYPES OF ALBERTA SCHOOLS*

Grade Scores	Urban		Town		Graded Rural		Ungraded Rural		Total	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
130-139	11	5.6	4	1.8	0	0	3	1.6	18	2.30
120-129	40	20.2	22	10.0	7	3.9	10	5.3	79	10.08
110-119	44	22.2	57	26.0	36	20.0	24	12.8	161	20.54
100-109	49	24.8	35	20.5	55	30.5	41	22.0	190	24.23
90- 99	26	13.1	61	27.9	53	29.4	55	29.4	195	24.87
80- 89	19	9.6	20	9.1	21	11.7	41	22.0	101	12.88
70- 79	6	3.0	8	3.6	5	2.8	11	5.9	30	3.83
60- 69	2	1.0	1	.5	2	1.1	1	.5	6	.76
50- 59	1	.5	1	.5	1	.6	1	.5	4	.51
TOTALS	198	100.0	219	99.9	180	100.0	187	100.0	784	100.00

*After Carmichael, Reid and Conquest.

To show the range of intelligence within a single classroom, eleven randomly chosen grade VII urban classes containing 385 children were subjected to study. The classroom with the least spread of intelligence was from I.Q. 91 to I.Q. 128, or 37 I.Q. points. The classroom with the greatest variation was from I.Q. 79 to I.Q. 141, or 62 I.Q. points. The average range in intelligence per classroom was 52 I.Q. points. While the spread in the individual classrooms was understandably less than in the total sample, it emphasizes the range of ability which the classroom teacher will meet in the ordinary single grade room.

Distribution of Achievement in Reading

The information shown in Table III was secured in the Alberta survey of achievement in reading and language. In this study the California Reading Test—a part of the California Achievement Test, was employed.

In this and later sections of this report grade scores will be used. Grade scores are frequently expressed as follows. The number to

the left of the decimal designates the grade, while the number on the right of the decimal indicates month in the grade. The grade scores show the performance of the average pupil for each year and month. For example, a grade score of 8.3 is the score made by the average pupil in the third month of grade VIII. When a pupil's test is marked, the total raw score obtained is found in the table of scores, and the equivalent grade score is secured from an adjacent column. Grade scores have the advantage of being more meaningful than raw scores as they indicate the grade level attained by each pupil taking the test. If the obtained grade score is higher than the pupil's actual grade placement, you recognize his work as satisfactory. If his grade score is lower than his grade placement his work is regarded as unsatisfactory. For example, a pupil who is in his third month in grade VII may secure a reading grade score of 8.5. We recognize that he is doing satisfactory work in reading. We also realize that he is 12 school months ahead of his actual grade placement in reading. Please note that there are ten months in the school year.

TABLE III

DISTRIBUTION OF GRADE SCORES IN READING ACHIEVEMENT OF GRADE VII PUPILS IN ALL TYPES OF ALBERTA SCHOOLS

Grade Scores	Urban		Town		Graded Rural		Ungraded Rural		Total	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
10.0-10.9	23	11.6	15	6.8	5	2.8	7	3.7	50	6.4
9.0- 9.9	37	18.9	45	20.3	31	17.5	20	10.6	133	16.9
8.0- 8.9	46	23.3	69	31.2	46	25.6	32	16.9	193	24.5
7.0- 7.9	58	29.5	51	23.0	66	36.7	61	32.3	236	30.0
6.0- 6.9	23	11.7	35	15.8	26	14.5	52	27.5	136	17.3
5.0- 5.9	5	2.5	5	2.3	6	3.3	14	7.4	30	3.8
4.0- 4.9	5	2.5	1	.5	0	.0	3	1.6	9	1.1
TOTALS	197	100.0	221	99.9	180	100.4	189	100.0	787	100.0

In this report the reader need not be concerned over whether the test norms are too high or too low. Our concern is that they express attainment in grade scores which permit a study of individual differences in achievement.

In Table III, we note that 787 grade VII pupils range in grade score from 4.5 to 10.8, a spread of over six grades. Of the total, 50 pupils or 6.4% have reached the grade X level while 4.9% or 39 pupils are below the grade VI level.

When we compare the subsamples for the Urban, Town, Graded Rural and Ungraded Rural children little difference in range of grade scores appears. Even the Urban sample, which proved superior to the others in average reading score, had as wide variability as any of the other samples.

But you may ask, 'What is the variation or spread in reading achievement in the ordinary classroom?' To answer this question eleven Urban grade VII classes with a total population of 346 pupils were randomly selected. The average enrollment was 35 pupils. The classroom with the smallest spread of reading scores had a range of 3.8 grades; the highest was 6.7 grades. The average range of reading achievement expressed in grade scores was found to be 5.0 grades.

Distribution of Language Scores

In this survey of reading and language achievement the California Language Test was used. Table IV presents the distribution of scores for 776 grade VII children composing the Urban, Town, Graded Rural and Ungraded Rural subsamples.

The range of language grade scores extends from 3.8 to 12.5, a spread of 8.7 grades with pupils working at 10 grade levels. 143 children or 18.4% of the total were at or above the grade X level while 72 pupils or 9.2% were at or below the grade VI level.

Again only slight differences in range were discovered between the Urban, Town, Graded Rural and Ungraded Rural samples.

In order to assess the variability of grade scores in individual classrooms, eight Town classes were randomly selected for the study. The total population of these eight classrooms was 219. The classroom with the least variability had a range of 3.7 grades, while the classroom with the greatest variability had a range of 5.8 grades. The average range per classroom was 4.6 grades.

TABLE IV

DISTRIBUTION OF GRADE SCORES IN LANGUAGE ACHIEVEMENT OF GRADE VII PUPILS IN ALL TYPES OF ALBERTA SCHOOLS

Grade Scores	Urban		Town		Graded Rural		Ungraded Rural		Total	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
12.0-12.9	2	1.0	1	.5	0	.0	1	.6	4	.5
11.0-11.9	6	3.0	3	1.4	1	.5	1	.6	11	1.4
10.0-10.9	42	21.3	44	20.0	30	16.1	12	6.9	128	16.5
9.0- 9.9	49	25.0	65	29.4	57	30.6	41	23.4	212	27.3
8.0- 8.9	50	25.5	63	28.8	58	31.2	57	32.5	228	29.4
7.0- 7.9	32	16.3	30	13.6	27	14.5	32	18.3	121	15.6
6.0- 6.9	9	4.6	12	5.4	12	6.5	24	13.7	57	7.3
5.0- 5.9	5	2.6	1	.5	0	.0	6	3.4	12	1.5
4.0- 4.9	1	.5	0	.0	0	.0	1	.6	2	.3
3.0- 3.9	0	.0	0	.0	1	.5	0	.0	1	.1
TOTALS	196	99.8	219	99.6	186	99.9	175	100.0	776	99.9

Distribution of Achievement in Spelling

Part of the Alberta survey of language achievement was the measurement of spelling attainment by means of an effective spelling scale which is part of the California Language Test. The data resulting from the study are presented in Table V.

The spelling test was administered to 777 grade VII pupils. Their scores range from grade 4.0 to grade 13.5, a spread of 9.5 grades. Eighty-eight pupils or 11.3% were at or above the grade XI standard, while 9.9% or 77 pupils were below the grade VII standard. No meaningful difference appeared in the distributions of the Urban, Town, Graded Rural and Ungraded Rural samples. Apparently the wide range in spelling achievement was as marked in the Urban and Town samples as it was in the Rural.

To examine the individual differences in spelling to be expected in a single classroom, eleven Urban grade VII classes of 340 pupils were randomly selected for the study. The lowest range in an

individual classroom was 3.6 grades, and the highest was 7.8 grades. The average range of achievement in spelling in the individual classroom was 6.0 grades.

TABLE V

DISTRIBUTION OF GRADE SCORES IN SPELLING ACHIEVEMENT (CALIFORNIA LANGUAGE TESTS) OF GRADE VII PUPILS IN ALL TYPES OF ALBERTA SCHOOLS*

Grade Scores	Urban		Town		Graded Rural		Ungraded Rural		Total	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
13.0-13.9	2	1.0	1	.5	.....	.....	2	1.1	5	.6
12.0-12.9	4	2.0	7	3.2	2	1.1	1	.5	14	1.8
11.0-11.9	29	14.8	17	7.8	17	9.1	6	3.4	69	8.9
10.0-10.9	40	20.2	43	19.6	40	21.5	28	15.9	151	19.4
9.0- 9.9	41	20.9	58	26.5	48	25.8	32	18.2	179	23.0
8.0- 8.9	43	21.9	49	22.4	45	24.2	40	22.8	177	22.8
7.0- 7.9	23	11.8	27	12.3	20	10.8	35	19.9	105	13.5
6.0- 6.9	7	3.6	11	5.0	11	5.9	17	9.7	46	5.9
5.0- 5.9	3	1.5	5	2.3	3	1.6	13	7.4	24	3.1
4.0- 4.9	4	2.0	1	.5	.....	.....	2	1.1	7	.9
TOTALS	196	99.6	219	100.1	186	100.0	176	100.0	777	99.9

*After Reid and Conquest.

Distribution of Achievement in Arithmetic

In a sample of 1,045 Alberta grade VIII pupils tested on the Iowa Every Pupil test of achievement in arithmetic, the range of achievement was from grade score 4.8 to 11.5, or 6.7 grades. 196 pupils or 18.76% scored at or above the grade X level, while 158 or 15.11% scored below the grade VII level.

When the table is reviewed for evidence of systematic differences between the four subsamples, none are apparant. Excepting for a single pupil in the Urban sample who scored at the grade IV level the Urban, Town, Graded Rural and Ungraded Rural revealed the same spread in achievement.

TABLE VI

DISTRIBUTION OF GRADE SCORES IN ARITHMETIC ACHIEVEMENT (IOWA EVERY PUPIL TEST*) OF GRADE VIII PUPILS IN ALL TYPES OF SCHOOLS IN ALBERTA**

Grade Scorces	Urban		Town		Graded Rural		Ungraded Rural		Total	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
11.0-11.9*	25	6.22	12	5.02	14	6.39	5	2.49	56	5.36
10.0-10.9	63	16.32	35	14.65	30	13.70	12	5.97	140	13.40
9.0- 9.9	91	23.57	59	24.69	39	17.81	32	15.90	221	21.15
8.0- 8.9	76	19.70	52	21.84	54	24.66	52	25.87	234	22.39
7.0- 7.9	88	22.80	51	2.34	52	23.74	45	22.36	236	22.59
6.0- 6.9	40	10.37	28	11.71	28	12.79	53	26.67	149	14.26
5.0- 5.9	2	.52	2	.83	2	.91	2	.99	8	.76
4.0- 4.9	1	.26	0	.00	0	.00	0	.00	1	.09
TOTALS	386	99.76	239	100.08	219	100.00	201	100.25	1045	100.00

*Test D—Form O. On the Iowa Test no norms are provided beyond the 11.0-11.9 interval.

**After Climenhaga and Pritchard.

In order to study the variations in achievement within the ordinary classroom, eleven Urban grade VIII classrooms were randomly chosen. These classrooms contained 386 pupils. Examination of the data showed that the smallest range of achievement in arithmetic in an individual classroom was 3.9 grades; the largest range was 6.2 grades. The average range per classroom was 5.0 grades.

Conclusions

To summarize the educational 'facts of life' concerning individual differences in Alberta classrooms certain conclusions are offered. They are trustworthy to the degree that sampling studies may be trusted. The inclusion of more classrooms and more children would unquestionably alter the findings. With that reservation in mind here are the findings.

1. In the Otis test the distribution of I.Q. scores of the 1,044 grade VIII children tested ranged from I.Q. 61 to I.Q. 141, a range of 80 I. Q. points.

2. On the California Short Form Test of Mental Maturity the scores of 784 grade VII pupils ranged between I.Q. 54 and I.Q. 137, a spread of 83 I.Q. points.
3. The average range of intelligence for eleven grade VIII classes was 52 I.Q. points.
4. The range of grade scores in reading achievement of 787 grade VII pupils was from 4.5 to 10.8, or 6.3 grades. The average range for the ten Urban classrooms studied was 5.0 grades.
5. In language the range of grade scores of 776 grade VII pupils was from 3.8 to 12.5, a spread of 8.7 grades. The average range within the eight classrooms studied was 4.6 grades.
6. In spelling the range of scores for the 777 grade VII pupils tested was from 4.0 to 13.5, a spread of 9.5 grades. When eleven classes were studied the average range of achievement was 6.0 grades.
7. The range of achievement in the arithmetic scores of 1045 grade VIII pupils was from 4.8 to 11.5, or 6.7 grades. The average spread of the eleven Urban classrooms studied was 5.0 grades.
8. No systematic differences appear to exist between Urban, Town, Graded Rural and Ungraded Rural children as far as range of ability or achievement is concerned.

As was stated at the outset, this is a report written for laymen. No effort at sophisticated treatment of the data has been made. Rather the intent is that the figures must speak for themselves. To assist them in becoming vocal these concluding observations are added. Your classrooms contain children whose intelligence ranges from that of the slow learner to that of the very superior child. In the average grade VII classroom the range of reading ability extends over five grades, in language over 4.6 grades, in spelling 6.0 grades. The range of arithmetic achievement in the average grade VIII classroom is over 5 grades.

It is known that children learn best working at or near their level of achievement, not at a level several grades above or below. The responsibility for meeting the wide differences in ability and achievement demonstrated to exist within the ordinary classroom is the burden borne by your teacher.

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AN ANALYSIS OF ENGLISH ERRORS AND DIFFICULTIES AMONG GRADE TEN STUDENTS IN THE SMOKY LAKE SCHOOL DIVISION

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The Problem

For a number of years the superintendent of schools, the principals, and the teachers of the Smoky Lake School Division have been concerned about the final results in grade XII English. During the last twelve years the percentage of students scoring "B" or better on the departmental examination has ranged from a low of approximately 20 to a high of about 50, with the average percentage of passes below 35. This has been about 25 per cent below the provincial average. On the other hand the number of passes in other grade XII subjects on departmental examinations has been average or slightly above. Many students who were contemplating a university education have been delayed a year or two because they lacked matriculation requirements in English.

It is obvious that English language difficulties in the Smoky Lake Division are not limited to grade XII but apply throughout the grades. This is especially true of written work. Several attempts have been made, through the use of standardized tests, to compare results in the Smoky Lake School Division with norms supplied with the tests. Little has been done, however, to determine where the greatest weaknesses lie.

The purposes of the present study were (1) to discover the English errors most common in the schools of the Smoky Lake School Division, (2) to identify those which seem to cause the greatest difficulty, and (3) to suggest possible means for improving standards.

Procedure

The grade X students in the Smoky Lake School Division were chosen for study. The grade X students in the McLeod School Division were chosen as a comparison group on the assumption that English does not present the same problem to them that it does to pupils in the Smoky Lake Division.

The *Cooperative English Test, Single Booklet Edition, Higher Level, Form S,* was administered to all grade X students in the two divisions during the second week of December, 1954. This gave results for 110 students in the following centres of the Smoky Lake School Division:

Smoky Lake	35
Vilna	33
Waskatenau	17
Bellis	13
Warspite	6
Spedden	6

and for 94 students in the following centres in the McLeod School Division:

Claresholm	37
Fort McLeod	22
Granum	18
Stavely	17

After the test had been scored, the raw scores were converted into scaled scores[1]. Scaled scores made possible the comparison of each student's achievement on one part of the test with that of any other, as well as comparisons between the scores for each of the two groups of schools and the norms supplied with the tests.

Comparisons between the groups of schools were made on the basis of average scaled scores for each of the three tests as well as certain parts of the tests. Average scaled scores were obtained for vocabulary, speed of comprehension, level of comprehension, and total reading comprehension. Likewise average scaled scores were obtained for mechanics of expression, effectiveness of expression, and total English score on the three tests. Comparisons were also made for each part of the test of mechanics of expression: grammatical usage, punctuation, capitalization, and spelling. The test of effectiveness of expression gave part scores on sentence structure and style, active vocabulary, and organization. In the absence of scaled scores on these parts, comparisons were made on the basis of the average number of correct responses. Reference to the booklet of norms supplied with the tests made it possible to compare the scaled scores of students in the McLeod and Smoky Lake School Divisions wih the scores made by students in the United States.

All students' test papers from the Smoky Lake School Division were analyzed to determine the number of students who marked each possible response in each item. This gave the frequency with which certain types of errors had been made. The investigator tried, wherever possible, to ascertain the reason for the errors and to determine the probable difficulties of students in the Smoky Lake School Division.

[1]Units so scaled that the scores will tend to form a normal distribution. It is so defined that a score of 50 represents the score which an average child would make at the end of a particular course if he attended an average school and had taken an average amount of instruction.

Nature of the Tests

The *Cooperative English Test, Single Booklet Edition* is a combination of a reading skills test and two English skills tests (mechanics of expression and effectiveness of expression), brought together to permit in two hours of testing time a rather full analysis and diagnosis of English abilities at the high school level.

Test A: Mechanics of Expression contains 60 items of grammatical usage placed in sentences, together with 45 items of punctuation and 24 items of capitalization presented in running prose. Spelling is presented in 60 items, each a choice between a misspelled and a correctly spelled word. *Test B: Effectiveness of Expression* contains three parts. Part I measures sentence structure and style by requiring comparative judgments between passages of prose placed in parallel columns, and choices among four versions of similar sentences. Part II is a test of active vocabulary in which the student must guess the words intended by definition and by clues of the first letter and length. Part III measures organization by rearranging disorganized paragraphs and by completing a partial outline. *Test C: Reading Comprehension* contains two parts: vocabulary—meaning tested by five choices, one of which is a synonym of a given word; and speed and level of comprehension—understanding tested by responses to seventeen brief reading selections drawn from widely different sources (informational, scientific, and literary).

Perhaps the most unusual feature of the tests is that the 90 comprehension items are arranged in three repeating scales of equivalent difficulty, each containing 30 questions based upon four to eight paragraphs per scale.

While speed of comprehension[2] is measured by a count of the total number of items accurately answered, level of comprehension[3] is scored by counting only items of completed scales. This eliminates the influence of speed upon the comprehension score and makes it a better measure of power of comprehension than is obtained in other timed tests.

The authors of the test state:

> In the vocabulary section of the test the average correlation coefficient between individual items and the total score is .52. For the reading section it is .40. Because the more discriminatory items in the reading section tend to have been placed first in the test, those items which actually determine an individual's score tend to have an average validity index greater than these average values. This is a desirable feature of the test which operates to increase its accuracy of measurement . . . . .

[2]**The Speed of Comprehension** score represents the product of the rate at which an individual has attempted to comprehend the test material and his success in comprehending it. It is not, like many speed-of-reading scores, merely a measure of the number of words read without regard to the thought content.

[3]**The Level of Comprehension** score provides a measure of the ability of the student to comprehend materials of increasing difficulty at the rate at which he chooses to work. It is a measure of "power" or "depth" of comprehension, indicating the extent to which a pupil is able to grasp the full import of what he reads.

The value of the intercorrelations between the scores on Test A: *Mechanics of Expression,* Test B: *Effectiveness of Expression,* and Test C: *Reading Comphrension* indicates that these tests measure related abilities; the correlation between *Mechanics* and *Effectiveness* is .67, that between *Mechanics* and *Reading Comprehension* is .60, and between *Effectiveness* and *Reading Comprehension* is .74[4].

Bear[5] reports:

Reliability coefficients have been computed which show considerable stability at the 50 point of the scaled scores. These range from .82 for a level of comprehension with only one scale completed to better than .90 for vocabulary and total scores. For secondary and college groups, correlations of between .70 and .80 with intelligence tests have been reported, and of between .39 and .73 with school marks.

Analysis of Test Results

Comparisons of average scaled scores of the two groups of schools used in this investigation were made with norms based on the scores of 90,000 students in 200 schools of the Public Secondary School System of the East, Middle West, and West United States. Table I compares the seven types of measure for which scaled scores were available.

TABLE I

COMPARISION OF McLEOD AND SMOKY LAKE SCHOOL DIVISION SCORES WITH UNITED STATES NORMS

Type of Score	U.S. Norms		McLeod School Division Scores			Smoky Lake School Division Scores		
	Average Scaled Score	Grade Level	Average Scaled Score	Grade Level	Grade Difference	Average Scaled Score	Grade Level	Grade Difference
Vocabulary	45.3	10.4	48.3	11.2	+0.8	41.8	9.6	—0.8
Speed of Comprehension	45.5	10.4	49.2	11.5	+1.1	41.1	9.3	—1.1
Level of Comprehension	45.4	10.4	49.2	11.5	+1.1	42.4	9.7	—0.7
Total Reading Comp.	45.4	10.4	48.3	11.2	+0.8	40.6	9.3	—1.1
Mech. of Expression	44.9	10.4	42.3	9.7	—0.7	39.8	9.1	—1.3
Effectiveness of Exp.	44.5	10.4	45.1	10.5	+0.1	38.5	9.0	—1.4
Total English	44.2	10.4	44.5	10.5	+0.1	38.8	9.2	—1.2

[4]Geraldine Spaulding and W. W. Cook, **The Cooperative English Tests—Their Construction, Interpretation, and Use, pp. 3-4.**

[5]Robert Murray Bear, "Review of Cooperative English Tests", **The Third Mental Measurements Yearbook, 1940.**

TABLE II

DISTRIBUTION OF SCALED SCORES OF 110 STUDENTS IN THE SMOKY LAKE SCHOOL DIVISION BY GRADE LEVEL AND FOR VARIOUS LANGUAGE MEASURES

Grade Level	Vocabulary		Speed of Comprehension		Level of Comprehension		Reading Comprehension		Mechanics of Expression		Effectiveness of Expression		Total English	
	Range of Scores	Number of Students	Range of Scores	Number of Students	Range of Scores	Number of Students	Range of Scores	Number of Students	Range of Scores	Number of Students	Range of Scores	Number of Students	Range of Scores	Number of Students
7	-33	0	-34	0	-34	0	-34	11	19-35	33	24-34	27	-33	0
8	34-39	36	35-39	51	35-39	51	35-39	45	36-39	20	35-38	35	34-37	55
9	40-43	36	40-44	30	40-43	15	40-43	24	40-43	29	39-42	19	38-42	33
10	44-47	29	45-47	10	44-47	19	44-47	14	44-47	14	43-47	17	43-46	14
11	48-50	4	48-50	8	48-50	12	48-50	9	48-50	5	48-50	5	47-50	1
12	51-53	2	51-53	5	51-53	9	51-54	6	51-53	5	51-53	4	51-53	5
12+	54-	3	54-	6	54-	4	55-	1	54-	4	54-	3	54-	2

McLeod School Division scores were higher than those of the students used in establishing the norms in all measures except mechanics of expression. On the other hand, students in the Smoky Lake School Division were from seven months to one and one-half years below the norms.

Since the average scaled scores of students in the Smoky Lake School Division were below the norms and below those of the students in the McLeod School Division, it was considered desirable to determine the distribution by grade level of the students according to their achievement in each of the seven measures. Table II shows this distribution.

Sixty-five per cent of the grade X students in the Smoky Lake School Division had a vocabulary score which was below the norm for their grade as rated by the Cooperative English Test. For each of the other measures, the proportion of students below the norm was as follow: Speed of Comprehension, 74%; Level of Comprehension, 60%; Total Reading Comprehension, 73%; Mechanics of Expression, 75%; Effectiveness of Expression, 74%; and Total English, 80%.

Analysis of Errors and Difficulties

The analysis of test papers of the grade X students in the Smoky Lake School Division revealed the prevalence of the following problems:

1. Difficulty in distinguishing shades of meaning.
2. Confusion of meaning because of similarities in sound, appearance, or derivation.
3. Inability to read and comprehend with the rapidity indicated by norms for the grade.
4. Failure to detect the usage errors *had of* and *would of* in sentences.
5. Failure to distinguish correct uses of *who, whom,* and *which* in sentences.
6. Difficulties with tense, especially in longer sentences.
7. Difficulty in using the apostrophe.
8. Failure to capitalize words as names.
9. Spelling difficulties associated with careless pronounciation.
10. Difficulties in explaining judgment about superior and inferior sentences.

Conclusions and Suggestions

Grade X students in the Smoky Lake School Division were found to be unable to read rapidly enough to attempt many of the items within their range of comprehension. It would seem that much could

be done for those students who display obvious errors in the mechanics of reading by providing the opportunity for supervised oral reading of easy materials and by preparing simple exercises in word recognition, syllabication, and phonetic analysis. Stearn[6] gives these suggestions:

1. Start pupil reading *something*. Be sure it is not too difficult, but be even more sure it is interesting to him.
2. Encourage him to read better and better books, not by telling him they *are* better, but by suggesting them as interesting reading. Be *sure* they are interesting.
3. Give him plenty of practice with well-organized remedial materials. He can really improve if given a chance.
4. Keep him well informed of his progress, both in relation to his own past performances and to the performance of the class and the groups.
5. Don't ask him for "book reports." Let him spend the time reading instead.

Students need to be encouraged to do more reading at the level at which they now are. For those who have not developed a real taste for reading, good magazines could be used to advantage. Certain magazines appeal to young people regardless of age, sex, or intelligence. These include *MacLean's*, *Readers' Digest*, *The Saturday Evening Post*, and *Collier's*.

> Many teachers have reported classroom experiences with magazines which have resulted in improved reading tastes and extended reading interests on the part of high school youth. It seems clear that the reading tastes of American people could be materially altered for the better, particularly in the field of magazines, if all schools were to provide youth with the opportunity to become acquainted with the many good materials available.[7]

There is evidence of a need for systematic vocabulary development. It appears that many students have fairly large vocabularies but are not always precise in their choice of words. Devices such as word games, good crossword puzzles, and word competitions could be used to stimulate vocabulary development. The dictionary is an important aid in learning the correct meanings of words encountered in reading. But unless words are filled with the content of personal experience, they are likely to remain empty symbols in the mind of the learner and hence be misused or readily forgotten.

> Power to get meaning from the printed page begins with word recognition. In the elementary and junior high school, teachers should arouse an interest in words, their multiple meanings, and their varied forms. They should help pupils develop a method of attacking unfamiliar words through the many techniques of word analysis, pursuit of context clues, and the use of the dictionary. This requires ingenuity in devising activities that both interest and challenge children and young people. Emphasis upon first hand experiences as a basis for giving meaning to words is especially important.[8]

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[6]Gertrude B. Stearn, **English in the Small High School**, pp. 259-260.

[7]John J. DeBoer and others, **Teaching Secondary English**, p. 264.

[8]National Council of Teachers of English, **The English Language Arts**, p. 398.

The danger of teaching vocabulary without reference to the content of experience is great when new words are introduced in lists for memorization of spelling and meanings without reference to context or need. Growth in vocabulary should be a by-product of new experiences demanding the use of new words for describing, identifying, or communicating. From this background of experience, words whose pronunciation, meaning, or spelling cause difficulty may be lifted for special consideration as separate items, but the procedure in such cases is always from the whole to the part.

More time might well be devoted to the study of homonyms, verb tenses, the apostrophe, and good informal usage (including necessary distinctions between *who, which,* and *whom*). Practice should be based mostly upon the students' own speech and writing.

> There is probably no better way to waste time than to ask students to change sentences which they themselves would never think of writing or saying. Unless the students recognize the language of the practice exercises as their own, the carry-over of the work into their personal, independent use of the language is destined to be small because of their failure to see any connection between the two.[9]

The use of the double negative, formerly so prevalent among students of Ukrainian origin, has diminished considerably.[10] Double negatives seem logical to these students because they use them, and correctly so, in their own language. (It is quite common and proper to use sentences with four or five double negatives in Ukrainian.) However, it is apparent that students of Ukrainian origin are beginning to think in English rather than compose in Ukrainian and translate into English.

Spelling appears to require some attention. Correct pronunciation would do much to eliminate many spelling errors among the grade X students in the Smoky Lake School Division. Correct pronunciation is a habit rather than a subject, and hence cannot be achieved as a unit boxed off for a few week's intensive study. The alternative is to make improvement in pronunciation a "continuous responsibility in all classes and an integral aspect of all oral work."[11]

Students need constant practice in the use of parallel construction to express parallel ideas. They need practice also in writing different sentence types. The ability to handle sentences well results from a gradual maturing of ability to think, to organize ideas, and to express ideas. The attack of the school strategically follows the natural stages of language development: (1) thinking and expressing single ideas, (2) thinking and expressing several

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[9]John J. DeBoer and others, **op. cit.**, pp. 91-92.

[10]See D. M. Sullivan, **An Investigation of the English Disabilities of Ukrainian and Polish Students in Grade IX, X, XI, and XII of Alberta Schools,** and C. H. Robinson, **A Study of the Written Language Errors of 1,238 Pupils of Ukrainian Origin.**

[11]John J. DeBoer, **op. cit.,** p. 109.

ideas, and (3) expressing ideas more interestingly through the use of a variety of sentences. Particular attention should be given to longer sentences with a view to avoiding unjustified partial sentences, run-on sentences, and poor sentence arrangement. The goal should be to incorporate good sentences in written and spoken English.

Above all, there is a need for a desire to improve. Practice on difficulties is one thing. Using effective expression in written and spoken English is another: it can come about only through a willingness to raise the standard of effective English in everyday practice.

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PROMOTION PRACTICES AND POLICIES IN ALBERTA SCHOOLS

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The Problem

Learning theory states that children learn school subjects best when taught "at the point of error." Economy dictates that in our public schools children shall be taught in groups or classes. The psychology of individual differences demonstrates widely different rates of growth in ability to learn school subjects. These three stubborn facts indicate the basic difficulties which must be faced in determining what grouping at what curriculum level is best for a given pupil. Policies range from those requiring complete mastery of subject matter at a grade level, through continuous promotion (one year equalling one grade), to progress through the grades at varying speeds.

In 1952 the Department of Education appointed a committee to study and to report on promotion policies and practices. This committee (J. G. Woodsworth, S. C. T. Clarke, H. Hamilton, F. W. Wooton, O. P. Larson, C. Safran, W. H. Worth, E. Read, and A. B. Evenson) studied the problem in the following stages:

1. Promotion practices and policies elsewhere (including other Canadian provinces, the U.S.A., European countries, Great Britain, Australia, and New Zealand).
2. Promotion practices and policies in Alberta schools.
3. Research evidence on the effects of different practices.

Afer the results of the above investigations had been considered, further steps were planned, as follows:

4. A study of parents' views on promotion practices and policies.
5. Recommended promotion policies adapted to varying conditions.

The committee decided that it was desirable to poll all Alberta teachers (including principals) of grades I - VIII to ascertain what students they intended to promote, and what beliefs and reasons they could give for these intentions as of June, 1954.

Method

A carefully prepared questionnaire was used to determine Alberta policies and practices. A deliberate effort was made to secure good motivation on the part of the participating teachers.

Anonymity was assured, and the questionnaire was designed for machine scoring.

The writer was assigned the task of preparing the first draft of the questionnaire. He asked a small number of teachers to write on two topics: reasons why they failed students in the past, and promotion policies they believed in or disagreed with. He also read the available literature. The first draft was then prepared and revised with the assistance of three colleagues. The second draft was tried out on seven teachers and revised according to these limited findings. The third draft was examined by a subcommittee and revisions were suggested. The fourth draft was mimeographed (200 copies) and tried out in a pilot run with the teachers (about 150) of two school divisions. The results were examined by the committee as a whole and further revisions were suggested. The fifth draft was prepared for printing, and included a major reorganization of the form of one table. The sixth and seventh drafts were refinements of the galley proofs, with adjustments for machine scoring. The eighth draft was distributed to the teachers and principals through their superintendents.

In an attempt to secure good motivation on the questionnaire teachers and principals were informed of the intended use of results. The superintendents had allowed time at their annual conference for an examination and explanation of the mimeographed form of the questionnaire. They undertook to distribute it, and to do what they thought most suitable to encourage teachers to complete it accurately.

Anonymity was insured by supplying a self-addressed envelope (address, W. E. Frame, Chief Superintendent of Schools). Attention was drawn to the fact that the questionnaire asked for neither the name of the school nor of the teacher.

Returns

There were 3,133 replies. On an estimate of 4,400 individuals teaching one or more grades of the grade I - VIII range, this gives a 56 per cent return. The 3,133 teachers had 80,649 pupils enrolled. On an estimate of 163,867 pupils enrolled in grades I - VIII in June, 1954, this gives a 49 per cent return.

Findings

Each of the following questions, together with the responses, deals with a major aspect of the questionnaire.

With whom is the promotion of individual pupils discussed by teachers?

(*a*) "With other teachers"—1,294 teachers reported (39.87% of the possible 3,133).
(*b*) "With the principal"—2,039 teachers (65.08%).
(*c*) "With the staff, in a staff meeting"—686 teachers (21.90%).
(*d*) "With the superintendent"—1,291 teachers (41.21%).
(*e*) "With none of the above"—278 teachers (8.87%).

It should be noted that any teacher might check more than one of the above. 537 of the 3,133 teachers were in one-room schools. Most of these would have, perhaps, only the superintendent to discuss promotions with; hence the relatively high proportion of responses under (*d*). It is clear that teachers do discuss promotions.

How is the final decision about promotions made?

(*a*) "Is entirely up to me"—494 teachers reported (15.77% of the 3,133).
(*b*) "Is made by me only after consultation with the principal or superintendent"—890 teachers (28.41%).
(*c*) "Is made by me, with special cases referred to principal or superintendent"—1,685 teachers (53.78%).
(*d*) "Is made by me, after consultation with principal and staff in agreement with a promotion policy adopted"—638 teachers (20.36%).
(*e*) "Is made by principal or superintendent after consultation with me"—150 teachers (4.79%).

These data support the conclusion that, with the exception of approximately 16 per cent of teachers reporting under (*a*) above, the final decision is made after consultation or confirmation, where this is possible.

What are the practices for conditional[1] *promotions?*

(*a*) Total number of pupils received and recognized as conditional promotions in September, 1953—2,111.
(*b*) Number of the above demoted for unsatisfactory performance —314 (14.87% of the 2,111).

The obvious conclusion is that, for the majority, conditional promotions are promotions.

When are parents informed of failure?

(*a*) "During the term, by interview or letter"—2,000 teachers reported (63.83% of the 3,133).

[1]**Conditional** here means that, subject to satisfactory performance, the child remains promoted; otherwise he is set back to the preceding grade.

(*b*) "By successive weak gradings during the term"—2,079 teachers (66.36%).

(*c*) "When the student takes home his June report card"—442 teachers (14.11%).

Since many teachers quite logically checked all three, it is clear that the general practice is to inform parents early of the possibility of failure.

How many superior students were given accelerated promotions during the year (at times other than June)?

338 students were so promoted. Since the teachers were in charge of 80,649 pupils, the percentage of acceleration during the term was 0.42.

How many students for reasons of age or social adjustment were promoted during the year (at times other than June)?

335 students were so promoted, a percentage of 0.41.

What promotion policies do teachers believe sound?

The results are presented in Table I, with policies arranged in general order of preference by teachers.

Since teachers were instructed that policies not checked "characterized neither your own belief nor school policy," the number checking the policy, less the number stating disagreement in the third column, indicates its support by teachers. It can be taken that the first four policies are supported by at least two-thirds of the 3,133 teachers, while the last four are supported by rather less than one-third of the 3,133 teachers.

It is clear that most elementary teachers in Alberta favor promoting a child if he has already repeated a grade. The majority view is that a child should be promoted unless there is clear evidence that non-promotion will be more likely to favor his all-round development.

On the other hand, it would seem that the Alberta elementary school teachers polled do not favor social or chronological promotions. In short, they favor a requirement of achievement standards.

What did the teachers intend to do about promotions in June, 1954?

The results are given in Table II. The number of students listed in each case is the number the responding teachers intended to fail or promote conditionally.

TABLE I

TEACHER BELIEFS ABOUT STUDENT PROMOTIONS

Policies	Number and Per Cent of Teachers checking Each Item			Total
	Policies I believe sound.	Policies which I believe sound and which characterize my school.	Policies which seem to be school policy but which I do not believe in.	
The child is failed only if it appears that he will profit by repeating the grade	656 23.3%	2,056 72.8%	107 3.9%	2,819 100%
No child is retained in any grade longer than two years	399 14.8%	2,004 74.3%	293 10.9%	2,696 100%
No child is to be held back unless holding him back will improve his adjustment	597 24.4%	1,704 69.8%	140 5.8%	2,441 100%
A child is promoted if there is evidence that he is working up to his measured capacity to learn	685 30.4%	1,405 52.5%	158 7.1%	2,248 100%
Minimum standards are set which students must meet in order to be promoted	564 32.2%	1,066 60.7%	124 7.1%	1,754 100%
Border-line pupils are conditionally promoted to the next grade	506 26.7%	1,119 59 %	271 14.3%	1,896 100%
In deciding promotions, we place emphasis increasingly from grade I to grade VIII in the importance of achievement in subjects	336 23.3%	955 66.1%	152 10.6%	1,443 100%
We fail students if their marks are below passing in certain major subjects	333 23.3%	937 65.6%	159 11.1%	1,429 100%
We permit the student to fail not more than one in each Division (Division I is grades I-III; Division II is grade IV-VI)	206 13.5%	969 64 %	348 22.5%	1,523 100%
The pupil must not get out of his social group	399 28 %	744 52.3%	279 19.7%	1,422 100%
If the child does his best, no matter how low his achievement, he is promoted	336 36.3%	389 41.9%	202 21.8%	927 100%
Chronological age is the main factor in determining promotion (i.e., one year equal one grade)	24 7.6%	76 24 %	216 68.4%	316 100%

TABLE II
NON-PROMOTION GRADES

Grade	Enrolment June 20th	Number to be Failed	Per Cent to be Failed	Conditional Promotions	Per Cent of Conditional Promotions
I	14,289	927	6.5	497	3.5
II	11,582	641	5.5	512	4.4
III	10,252	592	5.8	575	5.6
IV	10,118	537	5.3	524	5.2
V	9,923	560	4.6	558	5.6
VI	9,186	406	4.4	471	5.2
VII	7,918	470	5.9	594	7.5
VIII	7,380	354	4.5	356	4.8
TOTAL	80,649	4,387	5.4	4,087	5.1

The grade enrolments decrease from grade I through grade VIII. This decrease is the result of two important factors: first, the diminishing impact of the increased postwar birth rate on enrolment from grade I on; second, the retardation, over-ageness and dropping-out produced by the approximate 5 per cent failure in each grade. It should be recognized that if no pupil were failed more than once, on the basis of the above figures 43.5 per cent of all children starting grade I would fail one grade between grades I and VIII. This appears to be a very serious implication of the above figures. Are more than 40 per cent of Alberta grade IX pupils repeaters? How many are failed more than once? Sampling studies on these problems are indicated.

It is clear that the teachers who replied intended to use conditional promotions widely. If the 15 per cent subsequently demoted were added to the above figures, the total failure as of June - September would be 4,387 plus 15 per cent of 4,087, which gives a figure of 5,000 or 6.2 per cent of the total 80,649. On this basis, if no pupil is failed more than once, approximately 50 per cent of all children starting grade I would fail one grade between grades I and VIII inclusive.

The grade I failure rate is highest. However, if conditional promotions are included as failures, the grade VII rate is highest. Administrators may want to ponder the causes and implications of these two highest rates.

Comparing the number of accelerations reported by these teachers (338 because of superior ability plus 335 for reasons of age and social adjustment, a total of 673) with the number of retardations (4,387 plus the estimated 613 of the conditionally promoted pupils who will be set back, a total of 5,000) it is clear that over-ageness or retardation is developing in the Alberta schools as a result of promotion practices. For every child accelerated, seven are retarded.

The above figures are based on a partial return. How reliable are they? Evidence of retardation is given by McManus[2] in his M.Ed. thesis: he found at the grade IX level 2.2 per cent of pupils accelerated and 37.8 per cent retarded. The Department of Education's Annual Report,[3] however, does not indicate this kind of retardation. It is possible to compare the estimated 1,816 failures in grade I with a figure from the 1954 Annual Report of the Department of Education:[4] in June, 1954, there were 1,742 repeaters from the preceeding year. This means that 1,742 were failed in June, 1953. In June, 1953, the enrolment in grade I was 25.353, indicating a failure rate of 6.8 per cent in grade I. Our estimated failure rate for June, 1954, is 1,816 out of 27,939, or 6.5 per cent. But one should add the estimated number of conditionally promoted and subsequently demoted, indicating a failure rate of 7.0. Since the general trend of failure rate in grade I over the past years has been a decline, it is concluded that the figures presented in this study for grade I, and possibly for the other grades, are slightly high as statements of number or percentage failure.

What reasons did teachers give for failing students?

The reasons related to subject matter are presented in Table III.

This table makes it possible to compare the importance attached by teachers to weakness in various subjects, in any grade or across the grades. Obviously, reading is of paramount importance in grade I and declines in importance to grade VIII: 786 students out of 927 (84.8%) to be failed in grade I were especially weak in reading. Arithmetic retains uniform position as a cause of school failure. Why spelling should be given so frequently as a reason for failure in grades II and III may give administrators pause. The increasing emphasis on social studies through the grades is a clear trend.

2Thomas M. McManus, "A Survey of Pupil Progress in Edmonton City Schools," M.Ed. thesis, University of Alberta, 1950.

3Alberta Department of Education, **Forty-eighth Annual Report,** p. 116 (Table 9).

4Alberta Department of Education, **Forty-ninth Annual Report,** p. 125.

TABLE III

SUBJECT WEAKNESS OF STUDENTS TO BE FAILED

Reason	Number and Per Cent of Failures							
	I	II	III	IV	V	VI	VII	VIII
Reading	786 84.8%	555 86.6%	455 76.9%	392 73.0%	328= 71.3%	248 61.1%	282 60.0%	167 47.2%
Arithmetic	615 66.3%	359 56.0%	353 59.6%	331 61.6%	310 67.4%	264 65.0%	323 68.7%	242 68.4%
Language	396 42.7%	435 67.0%	397 67.1%	378 70.4%	323 70.2%	262 64.5%	366 77.9%	238 67.2%
Spelling	239 25.8%	514 80.2%	448 75.7%	385= 71.7%	320 69.6%	238 58.6%	269 57.2%	152 42.9%
Social Studies	144 15.5%	146 22.8%	197 33.3%	262 48.8%	282 61.3%	216 53.2%	347 73.8%	212 59.9%
NUMBER FAILED	927	641	592	537	460	406	470	354

Note: Any student may be failed for more tha none reason.

What other reasons are given for failing students?

The results are summarized in Table IV. The reasons cover general reference to school subjects, work habits, and the like.

The first six reasons refer mainly to inability to meet standards, the next five to motivational factors, while the remainder are not readily classifiable although it would appear that three of them are motivational also. Except for "Was at the bottom of the class" and "Showed poor study habits," the items are in order of frequency.

Of the total 4,387 pupils whom teachers intended to fail, for 3,568 the reason was "Would not be able to handle next year's work." It seems clear that in practice teachers fail students mostly on the basis of lack of mastery of academic subjects.

TABLE IV.

ADDITIONAL REASONS FOR FAILING STUDENTS

Number	Per Cent of 4,387	Reason
3,568	81.3%	Would not be able to handle next year's work.
3,310	75.5%	Had not mastered year's work.
2,573	58.7%	Another year would give him a good foundation to go on.
2,250	51.3%	Was below class standard.
2,058	46.9%	Is a slow learner; hence remaining in the grade would leave him closer to his level of achievement.
1,665	38.9%	Was at the bottom of the class.
1,774	40.4%	Showed poor study habits.
1,445	32.9%	Was inattentive.
1,174	26.8%	Was lazy, did not try.
1,036	23.6%	Was working far below potential.
880	20.1%	Needed to be shown that effort is required to get through school.
663	15.1%	Had poor attendance.
498	11.4%	Had a bad attitude.
496	11.4%	General interest and ability to get along with others below grade level.
466	10.6%	Had foreign language difficulty.
459	10.5%	Was disturbed by conditions in the home (death, separation, quarrelling, poverty, crime).
455	10.4%	Was sickly, lacked energy.
408	9.3%	Was small for his age.
307	7.0%	Was a trouble-maker.

Note: Any student may be failed for more than one reason.

Summary

1. Approximately 50 per cent of the teachers of grade I - VIII pupils completed the questionnaire. On the basis of two check points, total years of education and number of pupils failed in grade I, it would appear that this sample is representative of all teachers of grade I - VIII pupils.

2. Most teachers discuss the promotion of individual students with other school personnel, and make a joint rather than an individual decision about promotion.

3. Conditional promotions are used for many pupils, and in fact operate as promotions for all but approximately 15 per cent of the pupils so treated.

4. Most teachers claim that they notify parents early of possible failure.

5. Acceleration affects a small percentage of all students, but retardation affects many more. The ratio was one to seven.

6. The majority of elementary teachers favor promoting a child who has already repeated a grade. The majority also favor promoting a child unless there is clear evidence that non-promotion will more likely benefit him generally.

7. On the average, between five and six per cent of the students in each of the grades from I to VIII were to be failed. If no pupils were failed more than once, and all remained in school to the end of grade VIII, the cumulative effect of this practice would be that nearly half of Alberta students would fail one grade somewhere between grade I and the end of grade VIII.

8. Between grade I and grade VIII reading decreases in frequency as a reason for failure, social studies increases, while arithmetic and language remain fairly steady.

9. In general, the most frequent reasons given by teachers for failing students are associated with mastery of school subjects, and the next most frequent are associated with motivation and attitudes.

Conclusions and Implications

A finding of primary importance in this study is the emphasis which is placed by teachers on mastery of subject matter. Another very important finding is the relative absence of acceleration. Theoretically, if five per cent of the pupils in each grade are mastering school work so slowly as to warrant their repeating the grade, at the opposite extreme another 5 per cent should be mastering it so rapidly as to warrant taking two grades in one year or three grades in two years. Do administrative arrangements (i.e., grades) make this difficult if not impossible?

The net effect of the practices shown by this study is to produce over-ageness or retardation, with over-age and retarded pupils dropping out as soon as the law permits. The Annual Report of the Department of Education, Province of Alberta, shows that drop-outs reach sizeable numbers in grades VI to VIII[5], and the actual numbers are probably larger than those reported. Is retardation helping to cause drop-outs?

Teachers show a commendable desire to make promotions a *joint* responsibility, as it is, in fact, by law. Do administrative arrangements facilitate this? Teachers also claim that they notify parents early of possible failure. The cooperative approach suggested by these practices would seem to be very sound.

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[5]Alberta Department of Education, **Forty-ninth Annual Report.**

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A SURVEY OF ARITHMETICAL ACHIEVEMENT OF GRADE EIGHT PUPILS IN ALBERTA SCHOOLS

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Purpose of the Investigation

The need for a thorough investigation of the status of arithmetical achievement in Alberta has existed for some time. In April 1955 the Faculty of Education, with the assistance of the Alberta Research Committee, launched a survey to determine how well the present course of studies was meeting the needs of our youth in view of the recent emphasis in arithmetic. The influence of intelligence and sex and their corresponding relation to achievement was studied in the different types of administrative units that exist in Alberta. Comparison also was made between the Alberta children in this survey and the American pupils on whom the test norms were based to determine existing differences.

Selection of the Sample

The subsamples randomly chosen for this investigation were from four different types of Alberta schools—urban, town, graded rural, and ungraded rural. All Alberta cities were considered a part of the urban population. The town sample was chosen from the independent town school districts with a minimum enrolment of two hundred pupils as given by the Annual Report[1]. The graded rural pupils sampled were from divisions and counties which were reported as having at least three hundred conveyed pupils[2] within their jurisdiction. The ungraded rural sample was selected from one-room schools in various divisions and counties. Urban classrooms chosen had only one grade per classroom whereas the town and graded rural classrooms had not more than two. No restrictions were placed on the number of grades in the classroom in the ungraded rural schools. To insure more valid sampling all pupils in grade VIII classrooms were tested.

The Testing Instruments

The value of a test in any particular situation is determined by the purpose of the testing program, that is, by the specific facts or information desired. After careful consideration had been given the opinions of unbiased reviewers along with the purpose of the Alberta survey, it was decided to use the *Iowa Every Pupil Test of Basic Arithmetic Skills, Test D—Advanced,* to measure arithmetic

achievement and the *Beta Test: Form CM* of the *Otis Quick-Scoring Mental Ability Tests* as a measure of intelligence.

The Iowa Test, Form O, is divided into three parts: Part I—vocabulary and fundamental knowledge, Part II—computational skills in the four fundamental processes, and Part III—problem solving. In addition, the test yields a total score computed by finding the sum of the three parts. Brownell states that

> The items intended to test vocabulary and fundamental knowledge are well selected. The examples of Part II seem to agree with current school practices for the grades V to IX. And the verbal problem Part III relate to common social applications.[3]

The Otis test was constructed to measure "the probable rate of progress the pupils will make in school."[4] Kuhlmann suggests that "the choices of the different test items is ingenious and exceptionally well done."[5] In addition, the Otis tests have proven themselves among the best mental ability tests for the prediction of achievement in school subjects.

The time factor, cost, ease of administration, and machine scoring answer sheets were additional reasons for choosing both the tests used in this survey.

Treatment of the Findings

After the tests had been administered they were returned to the Faculty of Education, University of Alberta. Since machine-scored answer sheets were used the tests were quickly and accurately scored. The data were compiled on specially prepared assembly sheets, which facilitated the construction of frequency distributions. From these distributions the means, medians, standard deviations, standard errors, skewness and kurtosis were calculated.

Significant difference between the means, the medians, or the standard deviations was found by finding the standard error of the difference and then the resulting critical ratio. In the few cases where the homogeneity of the group appeared non-existent the application of the Cochran and Cox[6] approximation method was used to find significant differences.

To determine the degree of relationship between intelligence and achievement in arithmetic, product-moment coefficients of cor-

[1]Department of Education, **Forty-Eighth Annual Report**, p. 112.

[2]**Ibid.**, p. 151

[3]William A. Brownell, "Review of the Iowa Every Pupil Test of Basic Skills in Arithmetic," **The Third Mental Measurement Yearbook**, p. 421.

[4]Arthur S. Otis, **Manual of Directions for Beta Test (Otis Quick-Scoring Mental Ability Tests)**, p. 8.

[5]F. Kuhlmann, "Review of the Otis Quick-Scoring Test of Mental Ability," **The Nineteen Forty Mental Measurements Yearbook**, p. 235.

[6]Geeorge W. Snedecor, **Statistical Methods Applied to Experiments in Agriculture and Biology**, pp. 83-84.

relation were found. A test of the reliability of the correlation coefficients was made against the null hypothesis at the .01 level of significance.

Throughout the study statistical comparisons were made on the basis of obtained raw scores. Transmuted scores were used only to determine the equivalent raw score that pupils in grade VIII could be expected to attain as supplied by the Examiner's Manual.[7] Therefore, conclusions were based on the differences and the significant differences that were obtained between uncorrelated data.

Relation of Intelligence to Arithmetical Achievement

It is widely accepted that a definite positive relationship exists between intelligence and arithmetical achievement. "Intelligence, as measured by intelligence tests is closely associated with scholastic success."[8] This seems to agree with the definition of intelligence as given by the manual of the Otis Test.[9] If this is right, we would expect the differences found in mental abilities of the four types of schools tested would rank in the same order as the results obtained from the Iowa Every Pupil Test of Basic Arithmetic Skills. Furthermore, correlations made between the mental ability scores and arithmetic scores should show a reasonable consistency.

A comparison of the mean scores of the four samples randomly selected is given in Table I.

TABLE I

COMPARISON OF MEAN INTELLIGENCE SCORES AS MEASURED BY THE OTIS QUICK-SCORING MENTAL ABILITY TEST

Sample	Number	Mean	Standard Deviation
Urban	380	104.90	12.17
Town	222	101.30	11.90
Graded Rural	213	102.35	11.60
Ungraded Rural	201	97.50	12.33

Probably the most noticeable findings is the wide variation in the means scores of the urban and ungraded rural children. Another interesting although somewhat unexpected result is the comparatively good showing of the graded rural children. The mean of the

[7]H. F. Spitzer and others, **Examiner's Manual for Test D—Advanced Basic Arithmetic Skills**, p. 10.

[8]Arthur I. Gates and others, **Educational Psychology**, p. 281.

[9]Arthur S. Otis, **op. cit.**, p. 8.

graded rural exceeds the mean of the town. This finding reverses the order of these two groups as reported by Reid.[10] Differences of intelligence in the four types of Alberta schools were statistically significant except for that between the graded rural and town samples. Probably the environmental influence and the nature of the test were the two most important factors. The number of bilingual students may have had some influence on the mean scores, as approximately twice as many bilingual students were part of the town sample as were in each of the other three groups.

Many studies have reported correlation coefficients between mental ability and achievement in arithmetic. The results of the coefficients of correlations found in this survey are recorded in Table II.

TABLE II

COEFFICIENTS OF CORRELATION BETWEEN MENTAL ABILITY AND ARITHMETICAL ACHIEVEMENT

Sample	N	Part I	Part II	Part III	Total
Urban	380	.61	.54	.52	.69
Town	222	.60	.47	.55	.64
Graded Rural	213	.61	.38	.55	.64
Ungraded Rural	201	.62	.46	.54	.62

NOTE: Part I —Vocabulary and Fundamental Knowledge.
Part II —Computational Skills.
Part III—Problem Solving.

It is interesting to note that higher correlation coefficients were found for total arithmetic than for the three subtests. This suggests that a child's total achievement in arithmetic is more closely related to intelligence than any one phase of arithmetic. Of the three subtests, mental ability was found to correlate highest with vocabulary and fundamental knowledge. The low correlations between the computational skills and mental ability were partly affected by the number of perfect scores received by many of the grade VIII students on this part of the test. When tested against the null hypothesis all the coefficients of correlation were highly significant. This indicates a marked relationship between intelligence and arithmetical achievement.

[10]T. J. Reid and George R. Conquest, "A Survey of the Language Achievement of Alberta School Children," **The Alberta Journal of Educational Research** (June, 1955), p. 45.

Relation of Sex to Arithmetical Achievement

Differences that exist between the sexes in relation to intelligence and achievement in arithmetic are usually small and generally insignificant. Both heredity and environment are factors which many psychologists believe affect intelligence and achievement. The results of the present study add support to this belief.

Sex difference in intelligence

Before comparisons of sex differences in arithmetic were made, possible differences in intelligence between the sexes were studied. Table III gives the significance of difference of mean scores for the boys and girls on the Otis test. The negative sign indicates the superiority of the girls.

TABLE III

SIGNIFICANCE OF DIFFERENCE OF MEAN SCORES FOR BOYS AND GIRLS ON THE OTIS TEST

Sample	M_D	SE_D	CR	Significance
Urban	—1.17	1.24	.94	nil
Town	—1.39	1.59	.87	nil
Graded Rural	—4.82	1.56	3.09	.01
Ungraded Rural	—2.39	1.75	1.37	nil
Total Group	—2.11	.84	2.50	.05

NOTE: M_D—Mean difference; SE_D—Standard error of the difference of means; CR—Critical radio.

The superiority of the girls in the four areas tested would suggest that they do better than the boys on verbal tests of mental ability. This agrees with the general finding of other surveys. Of the four types of schools tested only the ungraded rural showed a statistically significant difference.

Sex difference in arithmetic

The various studies that have been made with respect to differences in arithmetical achievement between boys and girls suggest that differences that do exist are often statistically insignificant. However, such differences usually favor the boys. Table IV gives the differences as measured by the Iowa Every Pupil Test of Basic Arithmetic Skills. The negative sign indicates the superiority of the girls.

TABLE IV

SIGNIFICANCE OF DIFFERENCE OF MEAN SCORES FOR BOYS AND GIRLS IN ARITHMETICAL ACHIEVEMENT

VOCABULARY AND FUNDAMENTAL KNOWLEDGE					COMPUTATIONAL SKILLS				
Sample	M_D	SE_D	CR	Sig.	Sample	M_D	SE_D	CR	Sig.
Urban	2.93	.70	4.19	.01	Urban	.37	.49	.75	nil
Town	.13	.89	.15	nil	Town	—1.34	.65	2.06	.05
G.R.	1.14	.90	1.14	nil	G.R.	—2.63	.73	3.60	.01
U.R.	1.57	.92	1.71	nil	U.R.	—1.62	.81	2.00	.05
T.G.	1.29	.43	3.01	.01	T.G.	—1.01	.33	3.06	.01

PROBLEM SOLVING					TOTAL ARITHMETIC				
Sample	M_D	SE_D	CR	Sig.	Sample	M_D	SE_D	CR	Sig.
Urban	1.81	.41	4.40	.01	Urban	4.87	1.35	3.60	.01
Town	1.37	.55	2.49	.05	Town	— .09	1.78	.05	nil
G.R.	.14	.59	.24	nil	G.R.	1.59	1.96	.86	nil
U.R.	.55	.59	.93	nil	U.R.	.95	1.98	.48	nil
T.G.	1.14	.26	4.35	.01	T.G.	1.75	.88	1.99	.05

NOTE: M_D—Mean Difference; SE_D—Standard Error of the Difference; CR—Critical Ratio; Sig.—Significance; G.R.—Graded Rural; U.R.—Ungraded Rural; T.G.—Total Group.

Probably the most significant finding of Table IV is that the boys were superior to the girls in vocabulary and fundamental knowledge, problem solving, and total arithmetic, whereas in the computational skills the girls were superior. However, in none of the areas were there significant differences recorded throughout. The two most noticeable exceptions were found in computational skills (where the mean of the urban boys exceeded that of the urban girls) and in total arithmetic (where the mean of the town girls exceeded that of the town boys). It should also be noted that the significant superiority of the graded rural girls over boys in intelligence, as measured by the Otis test, was not repeated in arithmetic achievement as measured by the Iowa test.

Comparison of Arithmetical Achievement in the Four Alberta Samples

Previous studies comparing urban and rural children all suggest the superiority of the urban pupils in arithmetical achievement. The environmental influence has always been considered a strong factor in the development of the child. Blair states that "many investigations have clearly shown the remarkable way that mental growth may be facilitated or retarded by factors present in the environment."[11] In this study it was impossible to determine the degree to which mental ability and environment predicted achievement in arithmetic as achievement quotients tables were not provided. Sex differences had little influence in determining differences in arithmetical achievement in the four types of Alberta schools, since the proportion of each sex was approximately the same in each area. Table V gives a comparison of mean scores of the four Alberta samples on the Iowa test.

TABLE V

COMPARISON OF MEAN SCORES OF FOUR ALBERTA SAMPLES ON THE IOWA ARITHMETIC TEST

VOCABULARY AND FUNDAMENTAL KNOWLEDGE

Sample	N	M	SD
Urban	380	25.04	6.96
Town	222	25.31	6.60
Graded Rural	213	25.00	6.54
Ungraded Rural	201	22.30	6.48

COMPUTATIONAL SKILLS

Sample	N	M	SD
Urban	380	27.85	4.80
Town	222	27.29	4.84
Graded Rural	213	26.33	5.54
Ungraded Rural	201	24.98	5.78

PROBLEM SOLVING

Sample	N	M	SD
Urban	380	17.71	4.10
Town	222	17.61	4.02
Graded Rural	213	17.68	4.24
Ungraded Rural	201	16.07	4.26

TOTAL ARITHMETIC

Sample	N	M	SD
Urban	380	70.66	13.68
Town	222	70.18	13.20
Graded Rural	213	68.99	14.32
Ungraded Rural	201	63.50	13.92

In total arithmetic the four schools ranked as follows: urban, town, graded rural, and ungraded rural. The same general ranking

[11]Glenn Myers Blair and others, **Educational Psychology**, p. 32.

existed in each of the subtests. Achievement in reading as studied by Carmichael [12] produced similar results. A test of the significant differences between these means is found in Table VI. The negative sign in each section of the table indicates the superiority of the last group named.

TABLE VI

SIGNIFICANCE OF DIFFERENCE BETWEEN THE MEAN SCORES IN ARITHMETIC OF THE FOUR ALBERTA SAMPLES

URBAN AND TOWN

	M_D	SE_D	CR	Sig.
Part I	—.27	.57	.47	nil
Part II	.56	.41	1.37	nil
Part III	.10	.34	.29	nil
Total	.48	1.13	.43	nil

TOWN AND GRADED RURAL

	M_D	SE_D	CR	Sig.
Part I	.31	.63	.49	nil
Part II	.96	.50	1.92	nil
Part III	—.07	.40	.18	nil
Total	1.19	1.32	.90	nil

URBAN AND GRADED RURAL

	M_D	SE_D	CR	Sig.
Part I	.04	.57	.07	nil
Part II	1.52	.45	3.37	.01
Part III	.03	.36	.08	nil
Total	1.67	1.21	1.38	nil

TOWN AND UNGRADED RURAL

	M_D	SE_D	CR	Sig.
Part I	3.01	.64	4.73	.01
Part II	2.31	.52	4.44	.01
Part III	1.54	.40	3.82	.01
Total	6.68	1.32	5.07	.01

URBAN AND UNGRADED RURAL

	M_D	SE_D	CR	Sig.
Part I	2.74	.58	4.72	.01
Part II	2.87	.48	6.02	.01
Part III	1.64	.37	4.48	.01
Total	7.16	1.21	5.92	.01

GRADED RURAL AND UNGRADED RURAL

	M_D	SE_D	CR	Sig.
Part I	2.70	.64	4.22	.01
Part II	1.35	.56	2.42	.05
Part III	1.61	.41	3.97	.01
Total	5.49	1.39	3.95	.01

NOTE: M_D—Mean Difference; SE_D—Standard Error of the Difference; CR—Critical Ratio; Sig.—Level of Significance.

[12]Anne Carmichael, **A Survey of the Achievement of Alberta School Children in Reading**, pp. 18, 27.

From Table VI it is apparent that the town and graded rural schools are obtaining standards in arithmetical achievement which are favorable in view of the urban standards. Their only lack appears to be in computational skills. The ungraded rurad children, however, are considerably lower in attainment in arithmetic as found by this survey.

Comparison of Alberta Arithmetical Achievement With the Iowa Test Norms

Few comparative studies have been reported in which the arithmetic achievement of Alberta children, as groups, was compared with standardized test norms. The writer's understanding is that Alberta children have always achieved favorable results. This finding is not substantiated by the present survey. However, it should be noted that the majority of the pupils tested, when the norms were established, were from communities with populations ranging from 1,000 to 50,000. All were graded schools; no one-room schools were included.

As the test norms do not provide mean scores, comparisons were made between the median scores or 50th percentile scores. Table VII presents these comparisons.

TABLE VII

COMPARISON OF MEDIAN SCORES OF THE FOUR ALBERTA SAMPLES WITH THE TEST NORMS OF THE IOWA EVERY PUPIL TEST OF BASIC ARITHMETIC SKILLS

	Urban	Town	Graded Rural	Ungraded Rural	Iowa Test
Vocabulary and Fundamental Knowledge	25.33	26.34	24.91	22.38	26.50
Computational Skills	29.25	28.58	27.26	25.40	29.25
Problem Solving	17.66	17.78	17.55	16.16	17.67
Total Arithmetic	72.20	72.23	69.94	64.88	72.50

In all cases except two the medians of the Alberta sample were lower than the medians of the test norms. The best results of the Alberta pupils were found in problem solving; the poorest results appeared to be in vocabulary and fundamental knowledge. To assist further in analyzing these results the significant departures of the Alberta sample medians from the test medians are presented in Table VIII. The negative sign indicates the superiority of the Alberta group.

TABLE VIII

SIGNIFICANCE OF DIFFERENCE BETWEEN THE MEDIAN SCORES OF THE FOUR SAMPLES OF ALBERTA CHILDREN AND THE TEST NORMS

Sample	Mdn_D	SE_D	CR	Significance
Urban				
Part I	1.17	.45	2.60	.01
Part II	.00	.31	.00	nil
Part III	.01	.27	.04	nil
Total	.30	.88	.34	nil
Town				
Part I	.16	.56	.29	nil
Part II	.67	.41	1.63	nil
Part III	— .11	.34	.32	nil
Total	.27	1.11	.24	nil
Graded Rural				
Part I	1.59	.56	2.84	.01
Part II	1.99	.48	4.15	.01
Part III	.12	.37	.32	nil
Total	2.56	1.23	2.08	.05
Ungraded Rural				
Part I	4.12	.67	6.15	.01
Part II	3.85	.51	7.55	.01
Part III	1.51	.38	3.97	.01
Total	7.62	1.23	6.20	.01

NOTE: Mdn_D—Median Difference; SE_D—Standard Error of the Difference; CR—Critical Ratio.

Several factors are apparent from Table VIII. The graded rural and the ungraded rural pupils were significantly below the test norms in total arithmetic and most of the subtests. The urban children were significantly below the test medians in vocabulary and fundamental knowledge. In no case was the town sample significantly below that of the test norms. In only one of the sixteen cases did the Alberta median exceed that of the test norms.

The total results of these comparisons suggest that some improvement on the part of the Alberta children in grade VIII is desirable. Alhough the town and urban children compared satisfactorily in most of the areas tested, there appears to be a definite deficiency in arithmetical achievement of the rural pupils. This is particularly true of the ungraded rural children. Since the Iowa test places considerable emphasis on meaning and understanding as suggested by Ayers,[13] there seems some reason to believe that not enough stress has been placed on this phase of teaching in Alberta schools. The environment and intellectual factors again appear to play a prominent part in the achievement of the Alberta children.

Summary of Findings

Any testing program of this kind has certain limitations: obtaining a reliable sample, acquiring an adequate testing instrument, providing for similar testing situations, and interpreting the results scientifically. Within these limitations the conclusions based on the data accumulated from four types of Alberta schools may be summarized as follows:

1. On verbal tests of mental ability pupils from graded schools demonstrate a superiority over those from ungraded schools. The relatively good attainment of the graded rural pupils suggests that the school environment was largely responsible for the differences. The familiarity of the pupils with tests of mental ability also appears to influence the results.

2. The achievement of Alberta school children compares favorably with the norms of the Otis Quick-Scoring Mental Ability Test. The results obtained by the ungraded rural children are not too alarming in view of cultural factors.

3. The average correlation coefficient of .65 between the Otis Quick-Scoring Mental Ability Test and the Iowa Every Pupil Test of Basic Arithmetic Skills suggests that there is a relationship between intelligence and arithmetical achievement.

4. On the Otis Quick-Scoring Mental Ability Test the girls demonstrate a superiority to the boys; however, this superiority is not significant in three of the four types of schools tested. The verbal nature of the test appears to be the prime factor in this consistent result.

5. The boys show a general superiority over the girls in arithmetic, although in many cases it is not significant. However, in the computational skills the girls appear more efficient in all but the urban schools.

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[13]Frederick L. Ayers, "Review of the Iowa Every Pupil Test of Basic Skills," **The Third Mental Measurements Yearbook,** pp. 33-41.

6. The Iowa Every Pupil Test of Basic Arithmetic Skills does not adequately measure the superior grade VIII students in the computational skills. When used as a survey test it has some limitations; however, for normal classroom use and individual diagnosis it appears quite reliable.

7. The urban schools appear to provide the most efficient type of arithmetical instruction, but this superiority appears to be significant only when comparison is made with the ungraded rural schools. The results suggest that the ungraded rural schools are also significantly below the standards of the town and graded rural schools.

8. The standardization group of the Iowa Every Pupil Test of Basic Arithmetic Skills appears superior to the Alberta children in arithmetic. However, the town and urban pupils do not appear to achieve significantly below the test norms. The very poor attainment of the ungraded rural pupils is cause for concern.

9. On the three subtests the Alberta children appear to be most efficient in problem solving, least efficient in vocabulary and fundamental knowledge. If the Iowa test is one of meaningful arithmetic, the results suggest that more stress should be placed on meaning and understanding in arithmetic in the Alberta schools.

Recommendations

1. Every effort should be made by educational leaders and interested citizens of Alberta to encourage experienced and qualified teachers to teach in the ungraded rural schools.

2. Under favorable conditions the organization of the graded rural school should be encouraged.

3. Further testing programs should be considered to evaluate periodically Alberta standards so as to provide unbiased information concerning Alberta schools.

4. The development of a standardized arithmetic test based on the curriculum of the Alberta schools is recommended.

5. Teachers in Alberta should be encouraged to place more stress on understanding and meaning in arithmetic.

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A STUDY OF SPELLING DISABILITIES IN GRADES FOUR, FIVE, AND SIX

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Two recent surveys in language[1] gave some evidence that spelling achievement in Alberta is generally good. Nevertheless, many parents, teachers, and employers would like to know (1) why some children have spelling difficulties, (2) what is the nature of these difficulties, (3) what are the best classroom methods for preventing and overcoming these difficulties. It is possible to answer these questions by studying the pattern of symptoms exhibited by both good and poor spellers, and by conducting a series of controlled experiments to find the best teaching techniques. This is a study of the major difficulties of poor spellers and, as such, is a step toward improving spelling instruction.

Procedure

In 1953, the teachers of six Edmonton Public Schools submitted a list of grade IV, V, and VI students who were (1) one or more years retarded for their grade in spelling on the September City Spelling Ability Tests, (2) average or above average intelligence, (3) not new Canadians.

110 students of the 15 per cent referred by the schools were chosen for this study. 71 per cent of the 110 were from grade VI, 40 per cent being girls. The group had an average chronological age of 11 years 17 months, a spelling grade of 4.7, and actual grade placement of 5.5 The sample included children from the labouring and professional classes.

Data about spelling disability, word recognition skills, speech, related subjects, study methods, attitudes, personality, sensory functions, intelligence, and certain aspects of school progress were collected by objective tests, individual interviews, and examination of school records. Means and ranges were computed for all data except spelling errors, study habits, and pronunciation. In addition, inter-correlations of spelling, intelligence, reading, auditory discrimination, visual perception, phonics in context, and single phonic sounds were obtained. Correlations were not calculated for hand-

[1]H. T. Coutts and H. S. Baker, "A Study of the Written Composition of a Representative Sample of Alberta Grade Four and Grade Seven Pupils," **The Alberta Journal of Educational Research** (June, 1955), pp. 5-18; and T. James Reid and George R. Conquest, "A Survey of the Language Achievement of Alberta School Children," **The Alberta Journal of Educational Research** (June, 1955), pp. 39-52.

writing and composition because the mean achievement was very low, nor were they calculated for more than one of the phonic sound tests as each was a division of the same skill.

Testing

The selection of tests was partly guided by Dr. George Spache's outline for spelling diagnosis.

Spelling errors

To estimate the group tendencies for spelling error, the Spache Spelling Test of 120 words representing 13 types of errors was dictated. The mistakes were then categorized. For example, spelling *almoce* for *almost* contains errors of types 8 and 12, and spelling *libt* for *liberty* which has more than three errors is type 13 (see Table I). The test norms indicate the range of errors of average pupils. The errors on the Written Composition were also classified according to the 13 types, thus giving a pattern of the errors made in context, as well as in column spelling.

Word recognition skills

By grade IV, a child is expected to know the alphabet, isolated phonic sounds, and to be able to relate them to written symbols. To test this knowledge, each child was required to name a list of upper and lower case letters and to sound a list of the most commonly used vowels, consonants, digraphs, dipthongs, and blends. Only instant recognition was considered. To test knowledge sounds in context, each pupil was asked to read aloud a list of simple words containing the major sound elements. Word recognition is influenced by good auditory discrimination, and visual perception. A series of digits ranging in size from one to ten was given orally, and later shown visually by means of a tachistoscope for even timing and visibility. Twenty-five words of more than one syllable such as *recognition, permanent* and *remembrance,* were read aloud and recorded for pronunciation.

Related academic subjects

The three related academic subjects considered in this study are reading, composition, and handwriting. Reading depends on the same mechanical skills as spelling. Written compostion demonstrates the effectiveness of the teaching of spelling. Poor handwriting results in many spelling errors.

A cross-section of spelling achievement and the related subjects of reading, written composition, and handwriting was obtained by the Schonell Spelling, Graded Word Recognition Reading Test, and Composition Scale. The written compositions were also evaluated by the Ayres Scale for Handwriting.

Study habits and attitude

Through personal discussion, each child was asked what method he used to study spelling, and whether he considered himself a good, average, or poor speller. The pupil's study method was evaluated by checking on his use of the five recognized steps to be taken in learning to spell a word:—look, say, spell, write, check.

Personality

The Brown Personality Inventory of Children was used. A score over 18 shows below average adjustment.

Vision and hearing

The Edmonton Society of Optometrists gave a twenty-five minute visual examination to each child—ocular history and symptoms, external and internal examination, objective and subjective refraction far and near, muscle balance and visual skills tests. Vision testing in the schools is usually done by the Snellen Chart which is subjective.

The investigator examined each child's hearing with a Maico Audiometer. The findings were evaluated with the help of an Edmonton audiologist. Test results could be queried because a sound-proof room was not used.

School records of vision and hearing were tabulated.

Intelligence

To ensure that the intelligence of this group was not influenced by a lack of verbal ability, the SRA Primary Mental Abilities Test which has a total non-reading score was administered. Attention and concentrated effort were evaluated by the Memory Span for Backwards and Forwards Digit Test from the Wechsler Intelligence Scale for Children (WISC).

School history

This was obtained from the school records.

Findings

Spelling errors

Spache has found that good spellers tend to make errors which show an awareness of sound characteristics of words and letters, greater skill in phonics and better auditory discrimination, while poor spellers make errors in types 2, 11, 12, and 13, indicating the confusion and inaccuracy regarding sounds, as well as the poor auditory discrimination so often found among those with poor word analysis. From Table I, it can be seen that the group have more errors than would normally be expected in the omission of a doubled

letter, phonetic substitution of a word, and unrecognizable or incomplete words. They show only one of the characteristics of badly retarded spellers and none of the characteristics of good spellers.

TABLE I

ANALYSIS OF SPELLING ERRORS IN PERCENTAGES
(N=110)

Type of Error	Spache	Written Composition	Norm
1. Omission of a silent letter	10	9	9-17
2. Omission of a sounded letter	12	16	5-17
3. Omission of a doubled letter	11*	5	3-10
4. Addition by doubling	5	5	1- 5
5. Addition of a single letter	11	14	7-19
6. Transpositions or reversals	7	6	2- 7
7. Phonetic substitution for a vowel	11	10	11-25
8. Phonetic substitution for a consonant	8	4	5-14
9. Phonetic substitution for a syllable	3	3	2- 8
10. Phonetic substitution for a word	6*	7*	0- 5
11. Non-phonetic substitution for a vowel	3	4	1- 4
12. Non-phonetic substitution for a consonant	5	13*	2- 5
13. Unrecognizable or incomplete	14*	10*	0-13

*Excessive Errors.

In written composition, or spelling in context, they show excessive errors in types 10, 12, and 13, the latter two being characteristics of badly retarded spellers. Excessive errors in types 3 and 10 show some awareness of the sound characteristics of words and letters. There is a suggestion of poor visual imagery or lack of word meaning. Poor letter formations in handwriting were the main reasons for errors in types 12 and 13. In general, most errors fell within the normal range, but the number of non-phonetic errors was slightly more than the phonetic.

Word recognition skills

Table II indicates a good but not perfect knowledge of alphabet letter names. The greatest number of errors were made in the following order: L, l, I, X, B, J.

A knowledge of only 73 per cent of single sounds and 84 per cent of digraphs, diphthongs and blends, as found in this study, should cause difficulty in spelling. From 3 to 11 per cent of all errors were made in the following:

Vowel sounds	y, u, o, i, e, a
Consonant sounds	h, g, qu, w, c, x, z
Digraphs, dipthongs	oo, oi, oy, aw, au, wh, ay
Consonant blends	cl, gn, fl, sp, sw, sm, tr

Fewer errors were made with phonics in context. Of these errors, 41 per cent were in words using digraphs, diphthongs, and blends (example, *glue* and *market*); 35 per cent in words of more than one syllable (example, *contented* and *glittering*): 24 per cent in words with short vowel sounds (example, *mitt, van*). It was evident that the errors made in phonics in isolation and in context followed the same pattern.

Auditory discrimination and visual perception were as good as these achieved by a group of average adults in a previous study[2] reported by this investigator. These skills are factors in intelligence. Therefore this group, being of average intelligence, would be expected to have these abilities.

Although there were no noticeable speech defects, the group made many mispronunciations. Of the 88 per cent who could read the list of 25 words, 35 per cent omitted or inserted syllables, 27 per cent missed digraphs and diphthongs, while 11 per cent misplaced the accent. Again, this followed the same pattern as that on the phonic tests.

Related academic subjects

From Table II, it can be seen that spelling and reading have the same mean achievement, that is, well below actual grade placement. The written compositions were at a grade II level—short, unimaginative, and simple in vocabulary. This gave little opportunity for spelling errors. The handwriting was of grade II quality. Letter formation was poor (example, *m* and *t* became *n* and *f*); wrong letters were substituted; letters were connected by overwriting (example, *affended* became *attended*). As spelling and handwriting are tools for getting ideas on paper, a low composition score for this group is understandable.

Study habits and attitude

An effective study method was used by 2 per cent of the group, 27 per cent gave some evidence of knowing a method, 28 per cent wrote out the words, while others depended on home help, the

[2]D. Lampard, **Alberta Journal of Educational Research**, Vol. I. No. 1. p. 55 ff.

dictionary, and sounding. In estimating their own spelling achievement, 13 per cent thought they were good, 56 per cent average, 19 per cent poor, and 11 per cent did not know.

TABLE II
SUMMARY OF SPELLING TESTS DATA IN MEANS AND RANGES
(N=110)

	Mean	Range	Implication
Chronological Age	11-7	9.0-13 $11/12$	Over age for grade
Actual Grade Placement	5.5	4-6	
Alphabet (per cent)	98	88-100	
Single Sounds (per cent)	73	0-100	
Digraphs, diphthongs, blends (per cent)	84	25-100	
Sounds in Context (per cent)	97	76-100	
Auditory Discrimination for Digits	6	2-9	Good
Visual Perception for Digits	4	0-6	Good
Spelling Grade	4.7	2.4-5.0	Retarded
Reading Grade	4.9	2.4-8.0	Retarded
Written Composition Grade	3.02	2.6-5.6	Retarded
Handwriting Grade	2.0	1.0-6.0	Retarded
Personality Inventory	23	3-46	Below average adjustment
PMA Non Reading I.Q.	98	75-140	Average
PMA Total I.Q.	97	78-129	Average
WISC Digits	11	6-13	Grade VI level

Personality

The Personality Rating of 23 indicated below-average to poor adjustment. The school records showed that 25 per cent had some behaviour deviation—usually anti-social aggression.

Vision and hearing

The optometrists' findings, as listed in Table III, indicated that 22 per cent of the children required a complete visual examination,

while a further 21 per cent were considered borderline cases. The school records showed that 7 per cent failed and 10 per cent were borderline. These findings are not out of line with similar school visual surveys conducted in Canada and the United States, in which it has been found that the Snellon Chart usually detects only half of those who need visual attention.

Hearing did not appear to be a problem with this group, as only 10 per cent were considered borderline cases. Unless the defects were gross, few notations appeared on the school records.

TABLE III

VISION AND AUDITORY TEST RESULTS IN PERCENTAGES

	Vision		Hearing	
	Optometrists	Schools	Audiometer	Schools
Per cent passed	57	83	90	100
Per cent failed	22	7	0	1
Per cent borderline	21	10	10	0
Per cent wearing glasses or hearing aid	15	5	0	0

Intelligence

The Primary Mental Ability Test and the school test results placed the group in the normal range of intelligence. The total non-reading and the total score for the PMA showed little difference on the average, but the range was greater on the total non-reading score. This may indicate that there is more opportunity for students to show intellectual ability when reading is not involved.

The WISC Digits, although considered the least valid of that battery of tests, was high enough on the average to show a capacity for concentration and attention—a raw score of 11 gives a mental age of about 12 years, which is average for this group.

School history

In Table II, the wide range in chronological age (from 9 to 13 years 11 months, with the average age of 11 years 7 months) revealed a number of over-age children. This can be accounted for by the fact that 27 per cent were repeaters—70 per cent of these failed in the primary grades. Over the school years, 35 per cent had attended two schools, 28 per cent three schools, 11 per cent four schools, 3 per cent five schools, and 3 per cent six or more schools. There can

be no doubt that many of these children had difficulty in beginning to learn. Minor physical defects were found in 12 per cent of the cases.

Intercorrelations

In Table IV, the correlations of spelling with reading, auditory discrimination, and phonics in context, which were significant at the .05 and .01 levels, suggested that the same skills were being measured. These findings, together with those of visual perception and intelligence, compared favourably with other studies in the field. The correlation of .02 for single phonic sounds does not compare with those other studies. Does this mean that there is no relationship betwen single phonic sounds and spelling, or does it mean that single phonic sounds have not been emphasized in the school?

TABLE IV

CORRELATIONS OF SPELLING WITH OTHER TESTS

	Spelling
Reading	.66
Auditory Discrimination	.36
Visual Perception	.02
PMA Total Score	.02
Phonics in Context	.33
Single Phonic Sounds	.02

Summary and Conclusions

A study of 110 students in grades IV, V, and VI, who had average ability and were a year or more retared in spelling, revealed the following:

1. Confusions and inaccuracies caused by ineffective word recognition skills or poor handwriting.
2. Knowledge of sounds in isolation inferior to knowledge of sounds in context.
3. Little knowledge of syllabication as indicated in pronunciation.
4. Undeveloped language skills, revealed by retardation in the related subjects of reading, written composition and handwriting.
5. Little evidence of systematic study methods.
6. Inability to evaluate individual spelling achievement.
7. Low personality rating.

8. Twenty-seven per cent of sample were repeaters and many had changed schools.
9. Twenty-two per cent of sample had defective vision and many were borderline.
10. Few physical, hearing or speech defects.
11. Apparently normal ability in auditory discrimination, visual perception, and ability to concentrate.

No final conclusions may be drawn from these findings until a similar study of good spellers has been made.

Recommendations

In any further research in this field, the following recommendations are proposed:

1. A soundproof room should be used when testing hearing.
2. A vocabularly test should be given because meaning is an integral part of learning to spell.
3. Auditory discrimination and visual perception of words and phrases, as well as digits, should be tested.
4. For better understanding, interpretation of the project to parents and pupils should be uniform.

Educational Implications

In planning a spelling improvement program, it is necessary to evaluate every source of difficulty—spelling errors, word recognition skills, speech, related subjects, study methods, attitudes, personality, sensory functions, intelligence, and school history.

Any teacher wishing to show leadership in curriculum development can find the spelling disabilities of a class and experiment with different teaching techniques by using the following outline, which developed as a result of this and other studies:

1. Study school records.
2. Analyze spelling errors by collecting a minimum of 100 misspelled words for each child, and classify them according to the thirteen categories in Table I.
3. Evaluate word recognition skills, pronunciation, and study habits, by giving informal tests.
4. Summarize the major characteristics.
5. Select two or three of these major characteristics for improvement.
6. Plan a six to eight-week programme, using one teaching technique.
7. Evaluate the programme.
8. Use the findings of in-service training discussions.

EXTENSION OF THE STUDY

After completion of the foregoing study, the 110 students were divided into a control and experimental group, matched as to intelligence and spelling ability. The experimental group was subdivided into four smaller groups and tutored for nine one-hour sessions, over a period of three weeks. The programme was concerned with improving motivation, study habits, and word recognition skills, factors which had been found in the analysis to need immediate attention. A detailed reporting of the data is not made here because there was not sufficient time to do more than break down some of the old habits. However, a description of the teaching method is given, since it did promise something of value for further research.

During the first tutoring session, the students were informed of their spelling difficulties. After a discussion, they decided to concentrate as much as possible on spelling to see what improvement could be made at the end of three weeks. The students went so far as to relate sounds to the letter symbols on the license plates of passing cars.

The parents were invited to an evening meeting. The purpose of the project was explained, and they were asked to show a special interest. Those who wished to assist more specifically were given directions and materials for improving auditory discrimination and visual perception. It was stressed that training periods of about 15 minutes are the most effective.

At the beginning of each session, the tachistoscope was used for ten minutes. Noting what each child missed in forms and digits gave some understanding of how words are misspelled. For instance, some might see only the first part of the word, some the middle letters, while others might use the wrong sequence or reverse positions. This illustrated the necessity for greater concentration on word detail, and the advantages of being able to mentally photograph the word.

Next came more training in visual perception, with the addition of practice in auditory discrimination. Mimeographed lists of words containing the different phonemes were given to the pupils. The first day, the list contained words with the short "a". The children worked in pairs and helped each other to become familiar with these words. Each child was then asked to read them orally and as quickly as possible. While this was being done, the others watched for errors. Mistakes in pronunciation, omission or substitution were discussed by the whole group after the individual who performed had given his own analysis. After ten minutes of this, the lists were collected and preparations made for writing. The in-

structor read a series of these words quietly and quickly. Directions were given to watch the instructor's lip movement, to listen, to say the word to themselves, and then to write it down. Poor letter formation of any kind was counted as an error. The words were checked immediately and pupils explained the reasons for their errors. Each child kept a record of progress.

At this stage, there was a brief discussion on study habits or some point of interest about word meanings, etc. This was followed by Film Strips on Spelling.

The steps in learning how to spell were practiced by using five spelling demons a day, as follows: (1) Looking at the word in a dictionary (2) Finding the meaning, pronunciation and syllabication (3) Pronouncing the word as directed by the dictionary (4) Spelling the word orally, in syllables, and without looking (5) Checking oral spelling (6) Writing the word without looking, while saying it in syllables (7) Checking with the written word. At every other session, these demons were tested. Demons were used because they presented a challenge. Although the children were not acquainted with the other groups being taught, they were most interested in comparing the group results.

In this method, emphasis was placed on relating sounds and symbols by means of auditory discrimination and visual perception. In addition, stress was laid on the importance of having the child fully understand his own errors. By following the same routine, confidence is established. A short period of intensive treatment on a few difficulties forms new habits, which can then be practiced in the regular school programme.

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